THE EASTERN STATES HEAT WAVE OF APRIL 20–28, 1957

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1. INTRODUCTION

Temperatures during the month of April averaged above normal over practically all of the eastern half of the United States. Most States within the area east of the Mississippi River were either entirely or partially contained within the +2° C. anomaly isopleth. Most of the area of North Carolina, Virginia, Maryland, Delaware, and West Virginia was enclosed by the +4° F. anomaly, and a small portion of Virginia and Maryland was encircled by the +6° F. anomaly isopleth [1]. These limited values do not in themselves confirm a pronounced and prolonged heat wave during this month. However, an examination of weekly anomalies in the *Weekly Weather and Crop Bulletin* [2] or in figure 3A in the article by Andrews [3] indicates that the monthly anomalies were definitely weakened by the subnormal temperatures present over the East during the first half of the month.

The transitional period from below normal to above normal temperatures was of ephemeral duration. This was manifest by comments entered on the April Local Climatological Data forms and as specifically expressed by the Green Bay, Wis., Meteorologist in Charge: "Overnight in the middle of the month weather turned from March type to late May type." Much of the East was under the influence of this heat wave throughout the latter half of the month and thus the semimonthly temperature chart as presented by Andrews [3], figure 4B, depicts a large +10° F. anomaly area.

The higher temperatures occurred, for the most part, during the period of April 21–28. Generally, it was within this interval that many stations recorded readings that equaled or exceeded records previously established for these dates. However, the occurrence of new maximum temperatures for the month of April was reported by only a few first order stations.

2. ANTECEDENT CONDITIONS

Two distinct weather patterns existed over the United States during the month of April with the initial regime being nearly a complete reversal of the second. Chronologically this reversal of pattern occured almost precisely at the mid-point of the month. (See fig. 1 of Andrews [3].) Generally the upper-air picture during the first two weeks of April 1957 was characterized by trough-ridge systems of small amplitude over the United States.

A slow eastward progression of the long-wave trough-ridge positions prevailed over the North Atlantic in this initial 2-week period with the trough line in evidence along the east coast by the end of the fortnight. Simultaneously with the eastward drift of the planetary patterns were the more frequent and faster-traveling short-wave troughs and ridges which traversed these long-wave patterns.

Moderately strong zonal flow at 500 mb. was prevalent over the eastern United States during the first half of the month and it extended westward to the Pacific during the last 10 days of this period. This upper flow resulted in a dynamic succession of pressure systems on the surface chart in association with the previously mentioned short-wave troughs and ridges plus a resultant rapid interchange of airmasses. The jet stream was located close to the normal April position west of the Continental Divide but east of that area it was displaced approximately 5° southward. In this anomalous position it was associated with a similar southward displacement of the polar front and related storm tracks. The result of these factors was illustrated by the occurrence of below normal temperatures and above average precipitation over the eastern States during the first 15 days of April.

Between the 13th and the 18th of the month a significant change occurred in the pressure patterns of the troposphere. In part, this rapid and pronounced transition was occasioned by a readjustment in the long-wave trough pattern over the Northern Hemisphere. Related to the adjustment of westerly wavelengths was the placement of a low-latitude long-wave trough over the west coastal area of the United States, as well as the rapid progression of the long-wave ridge into the eastern half of the country. In the western Atlantic region the long-wave trough advanced to near 45° W., where initially it weakened. Upon attaining these positions the eastward progression of the long-wave features decelerated and became practically stationary. However, shortly after the 18th of the month the amplitude of major surface and upper-air troughs and ridges increased and strong meridional flow developed. Concomitantly the jet stream recurved northward over eastern United States. Cyclonic and frontal activity was restricted to the western portion of the country. Thus, pressure patterns had become favorable for an early spring heat wave and a period of light rainfall over the eastern United States.

3. SYNOPTIC CONDITIONS

High pressure blanketed the eastern half of the United States on April 18, 1957, as it had for the previous 2 days. It was associated with a large polar High that had moved southeastward from Canada passing across the Great Lakes and the Middle Atlantic States. From the center of this old Canadian High, now 1033 mb. and located near 37° N., 47° W., extended two elongated ridges, one stretching inland over North Carolina to eastern Arkansas and the other reaching northwestward over Massachusetts into Northern Ontario. High centers in this latter ridge were weak as may be observed on the 1830 GMT chart (fig. 1A). The returning flow from this large but modified polar airmass was now spreading westward and northward over the eastern and east-central States. A weak warm front associated with this southerly or southeasterly flow of transitional polar air lay across the northern and north-central tier of States. It stretched from Maryland to northern Illinois and thence into a Low centered over southwestern Wyoming. In the Gulf States the airmass was acquiring tropical maritime characteristics.

In the ensuing hours ending 1830 GMT April 20, the Wyoming cyclone progressed into North Dakota where it weakened as cyclogenesis occurred along the trailing stationary front over western Kansas. These two areas of low pressure continued to advance northeastward and eastward about the periphery of the anticyclone over the eastern United States. The Kansas Low intensified as it reached the northern shore of Lake Superior at the end of the 48-hour period. However, the first Low had continued to dissipate within an area of pronounced troughing in advance of the developing center.

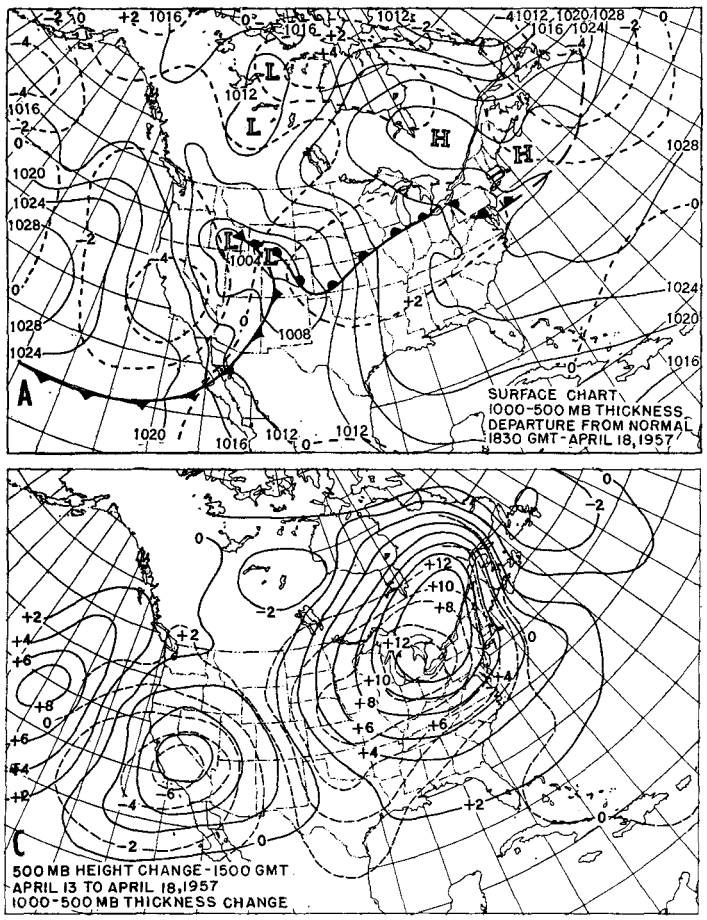
Concomitant with the movement of the Lows was the southeastward and eastward motion of the two highs that had been located in the ridge that extended northwestward from the Atlantic anticyclone center. The northernmost High came to rest off the coast of the Carolinas while the other progressed to a position some 350 miles southeast of Newfoundland. A ridge extending from the polar region southward to Oklahoma, then breaking sharply to the east, interconnected the two Highs with a new anticyclone that was located 100 miles north of Fort Smith, District of Mackenzie.

East of this new Canadian High was an intensifying cyclone near Frobisher, Baffin Island, which in conjunction with the building anticyclone had advected cold air southward, and in so doing had produced a suitable thermal field for the generation of a cold front along the 55th parallel. At the same time the warm front over the eastern and central States had been carried northward into Canada by the moderate southerly flow of warm air south of the front. However, over the New England States this southerly advection had been delayed by the southeastward push of the high cell toward the Carolinas. This resulted in a sharp southward bend on the warm front over Vermont from whence it stretched into eastern Maryland. More precise movements of pressure centers during the period of this study may be examined in Charts IX and X.

Movements of High and Low centers and associated warm and cold fronts were quite pronounced during the next 24 to 48 hours, but most of the pressure field progression occurred over Canada or the New England States. By the end of 24 hours, or 1830 GMT April 21, the Low previously near Lake Superior was approaching Newfoundland, while the Fort Smith High dropped rapidly southeastward to near Moosonee, Ont. Briefly, within this period, New England was located in the warm sector, long enough to establish a few temperature records on this Easter Sunday. Similar maximum temperatures occurred on this day to the south of that region. By evening (GMT) the trailing cold front from the Newfoundland Low was crossing New England, southwestern Pennsylvania, and the southern portions of Ohio, Indiana, and Illinois. Furthermore, the cold front previously along the 55th parallel was in close pursuit of the initial front in the New York and New England sector. High pressure continued off the Carolinas while the surface ridge remained along and just east of the Mississippi River.

In the ensuing hours ending at 1830 GMT April 22, high pressure again enveloped the eastern half of the nation and most of eastern Canada as the Moosonee High progressed southeastward to near Boston, Mass. This anticyclone continued to be interconnected by ridging with other High centers, the nearer two being located over Hudson Bay and 300 miles east of the Georgia coast. By now the cold front had been displaced southward along the east coast to near Cape Hatteras, and in many respects acted similarly to a "back-door" cold front with cooling effects being felt principally east of the Appalachians. Strong southerly flow persisted over the Plains as a new Low formed over western Colorado to aid in the northward transport of warm air.

In the upper-air circulation during this 5-day period the rather broad long-wave ridge which was present on the 1500 GMT chart of April 18 (fig. 1B) increased in amplitude over the East as the adjacent long-wave troughs deepened. Several weak short-wave troughs, in association with the surface Lows, traversed this long-wave ridge across southern Canada. The 700-mb. and the 500-mb. height anomalies were considerably above normal during these five days. From April 19 to 22, at 500 mb. the height departure over the eastern Great Lakes and portions of New York and Pennsylvania exceeded +800 ft. The 1000–500-mb. thickness anomalies indicated on figure 1A, continued to increase during this same period and at times ranged from 600 to 800 ft. above the April normal. Further amplification of the long wave trough-ridge system occurred as indicated by the 5-day 500-mb. and 1000–500-mb. change chart (fig. 2C). On this chart it should be noted that retrogression of the ridge occurred toward the Lake Winnipeg area and that heights increased 200 ft. or more over the northeastern States and south-central Canada. Troughing along the Continental Divide



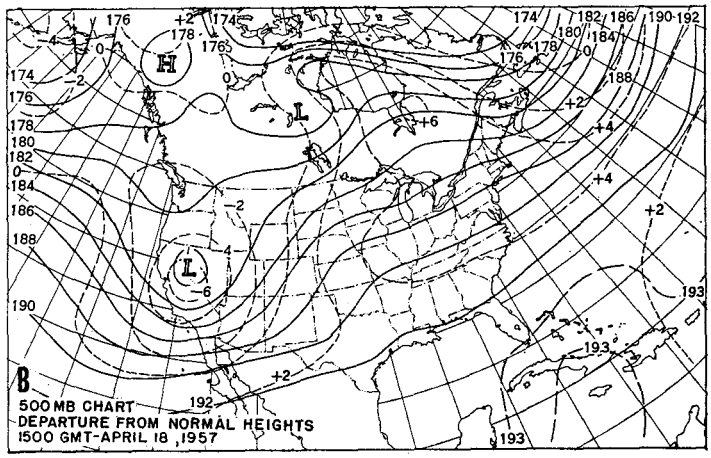


FIGURE 1.—(A) Sea level chart for 1830 GMT, and 1000–500-mb. departure from normal thickness pattern (dashed) for 1500 GMT, April 18, 1957. (B) 500-mb. contours and departure from normal (dashed) for 1500 GMT, April 18, 1957. (C) 500-mb. 5-day height change and 1000–500-mb. 5-day thickness change chart (dashed) 1500 GMT April 13–18, 1957. Height values on all charts in hundreds of feet.

was well defined with falls of as much as 600 ft. Possible ridging was indicated over the West Coast States by the 400-ft. rise over central California. Similar changes may be observed at the 1000-mb. level by graphical subtraction of the two charts represented on figure 2C.

Over eastern North America, by this time, the 700-mb. jet stream was approximately 5° north of its usual April position in the vicinity of Chicago, Ill., and reached a maximum deflection of 10° north of the mean near Caribou, Maine. Thus, with a jet in this position and pronounced blocking directly east of the jet, continuation of mostly fair weather and high temperatures was assured for the area east of the Mississippi River.

Synoptic conditions at 1830 GMT April 23 are shown in figure 2A–B and they present a somewhat repetitious picture of the preceding as well as the ensuing synoptic conditions that prevailed during the heat wave. Illustrated are the persistent High off the Atlantic Coast, the anticyclone over the Hudson Bay region, and the recurrent Low over the western or west-central States. Frontal conditions were similar over the northern portion of eastern United States, southern Canada, and the Central States.

However, during the greater portion of this next 5-day period the movement of pressure centers and fronts proceeded at a much slower pace. The surface High in the vicinity of Port Harrison was retarded, progressing eastward a few degrees of longitude per day; thus in principle it became a blocking High from the 23d to the 26th of April. Consequently, the vigorous Colorado Low was forced northward or northeastward and approximately 72 hours elapsed prior to its arrival over Port Harrison. During these three days the moderate southerly flow over the eastern half of North America was maintained or even intensified as the Low moved into Canada. The trailing cold front over the central States dissipated leaving a cold trough in its stead. But modified tropical air continued to flow northward reaching into portions of southern Canada.

A slight respite from the prolonged heat wave did occur during the early stages of this latter 5-day period, and was occasioned by another "back-door" cold front. The area affected was again the New England States, eastern New York, and the region southward into Maryland. From the 24th through the 26th of April this front remained approximately stationary extending northward from the vicinity of Washington, D. C., to the proximity of, but slightly east of, Buffalo, N. Y. East of the front temperatures were near normal while above normal readings continued in other eastern States.

However, during this period of milder weather a gradual transition occurred in the pressure patterns over the Far West. The eastern portion of the Pacific High progressed onshore as the Colorado Low moved northward into Canada. This eastward push of Pacific maritime air in contrast to the tropical maritime air over the central and eastern portions of the United States developed a sufficient thermal field to produce cold frontogenesis. On the 1830 GMT chart of the 26th this cold front extended from Duluth, Minn., southward to Oklahoma City, Okla., and then curved sharply southwestward.

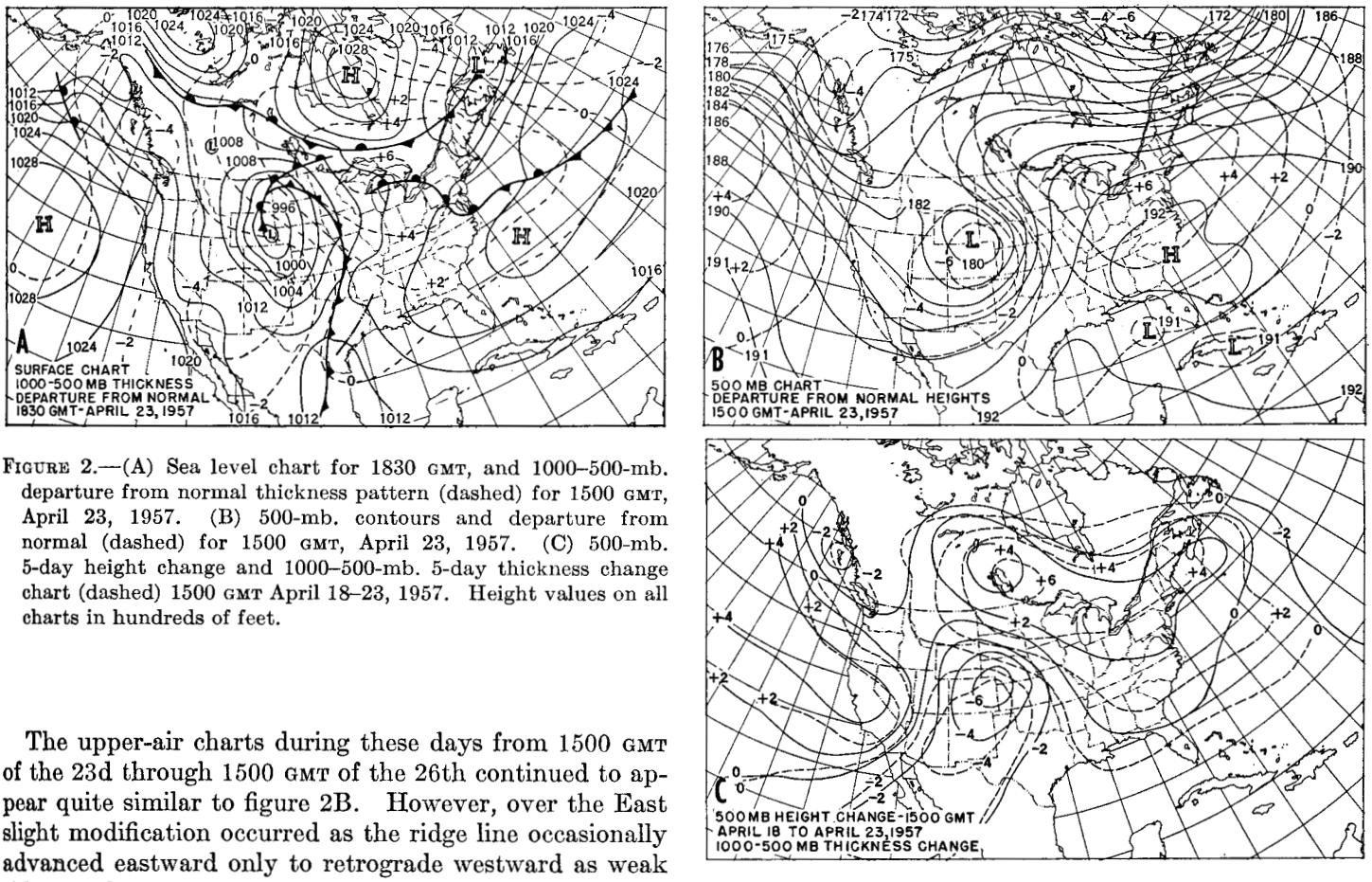


FIGURE 2.—(A) Sea level chart for 1830 GMT, and 1000–500-mb. departure from normal thickness pattern (dashed) for 1500 GMT, April 23, 1957. (B) 500-mb. contours and departure from normal (dashed) for 1500 GMT, April 23, 1957. (C) 500-mb. 5-day height change and 1000–500-mb. 5-day thickness change chart (dashed) 1500 GMT April 18–23, 1957. Height values on all charts in hundreds of feet.

The upper-air charts during these days from 1500 GMT of the 23d through 1500 GMT of the 26th continued to appear quite similar to figure 2B. However, over the East slight modification occurred as the ridge line occasionally advanced eastward only to retrograde westward as weak ridges and attendant anticyclonic vorticity moved northward about the western periphery of the long-wave ridge to reintensify the ridge in its old position.

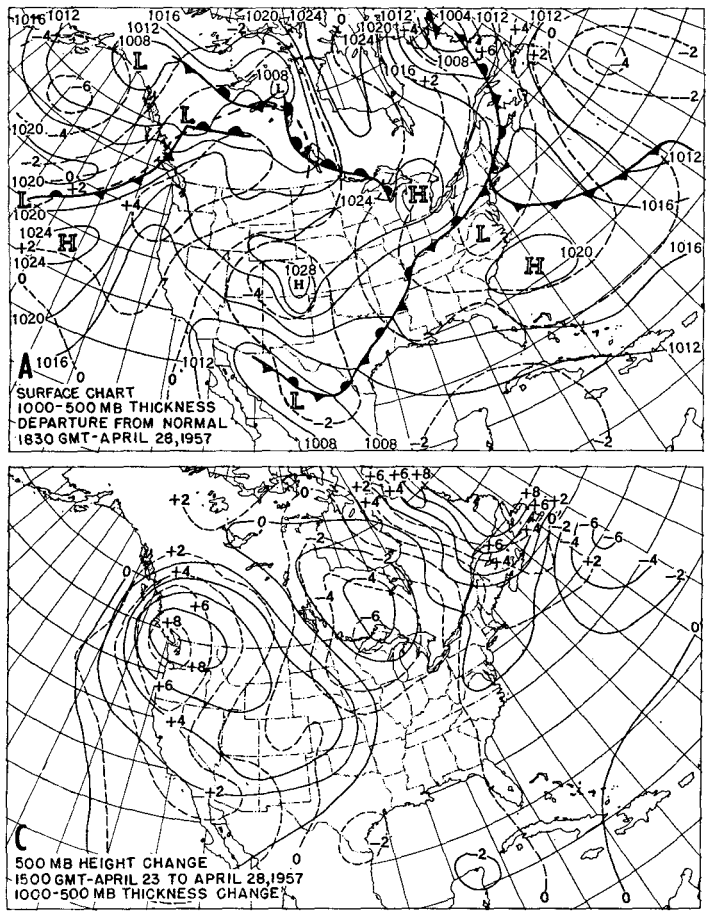
In the subsequent 24 hours the 500-mb. eastern ridge indicated definite displacement toward the Atlantic seaboard, while slight ridging appeared in the western sector of the long-wave trough over the Rocky Mountain States. At 1830 GMT April 27, the surface chart distinctly presented a changed pressure pattern. By then the moderate southerly flow of tropical maritime air had practically ceased over the eastern and east-central States. A moderate Pacific cold front had advanced eastward and extended from Detroit, Mich., southward through Springfield, Mo., to Laredo, Tex. High pressure centers over the East or along the eastern coastal waters had decreased in intensity and were separated by troughing. As these conditions developed over the eastern part of the country ridging intensified above the western States. The central portion of the ridge at this time extended from the coast of Washington and Oregon to eastern Nebraska. Two 1026-mb. high centers were located within this ridge.

The closing stage of the heat wave is depicted by the charts in figure 3. These charts clearly define the advancing cold front, the loss of southerly flow, the weakening and broadening of the upper trough, and the eastward movement of the 500-mb. height changes and the 1000–500-mb. thickness changes. Thus, a return to more normal conditions and the death of a heat wave were indicated.

4. AREA AND INTENSITY OF HEAT WAVE

That this was a prolonged as well as a pronounced heat wave over the eastern States is indicated by a few facts and statements from the April Climatological Data. A study of these data revealed that between the 18th and 30th of the month the majority of eastern stations recorded average daily temperatures greater than the monthly normal. The area covered for 10 or more days with temperatures 6° F. or more above the monthly normal is outlined in figure 4. All of the region east of the Missouri and Mississippi Rivers, with the exception of Florida and portions of the coastal regions, was enclosed by this value. For increased anomaly values the size of the shaded areas decreases, the maximum value being reached in the Buffalo, N. Y., area on April 24 and 25 when maxima of 87° F., a deviation of 31° F. from the monthly normal on April 25, were recorded.

A few of the comments on the April Local Climatological Data forms from various stations might be of interest in relation to the warmth of the period. Akron, Ohio reported: "last 10 days of April produced average temperatures comparable to late June or early August." Cincinnati, Ohio: "Period of 19–27 was longest with maximum temperatures over 80° F. ever recorded in April." Lynchburg, Va.: "Heat wave 18–30 was longest to occur in April on record." Richmond, Va.: "The warm spell beginning on April 17 to the end of the month was the warm-



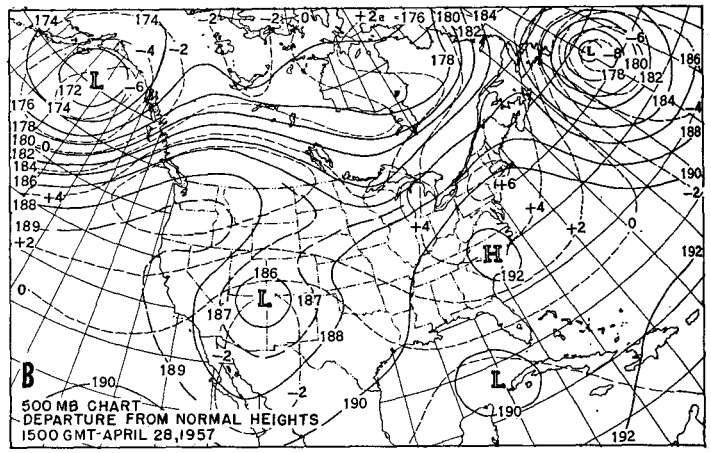


FIGURE 3.—(A) Sea level chart for 1830 GMT, and 1000–500-mb. departure from normal thickness pattern (dashed) for 1500 GMT, April 28, 1957. (B) 500-mb. contours and departure from-normal (dashed) for 1500 GMT, April 28, 1957. (C) 500-mb. 5-day height change and 1000–500-mb. 5-day thickness change chart (dashed) 1500 GMT April 23–28, 1957. Height values on all charts in hundreds of feet.

TABLE 1.—*Temperature records established or equaled, April 1957*

Station	April 1957								
	20	21	22	23	24	25	26	27	28
Hartford, Conn.		H							
Wilmington, Del.		H			T				
Washington, D. C.		H							R
Augusta, Ga.			T						
Louisville, Ky.	H								
Portland, Maine		R							
Baltimore, Md.		H							E
Boston, Mass.		H							
Nantucket, Mass.					H				
Alpena, Mich.	H								
East Lansing, Mich.	H								
Newark, N. J.		H			T				
Trenton, N. J.		H			H				
Buffalo, N. Y.	T		H		R	R		T	
Rochester, N. Y.					H				
Charlotte, N. C.		H	H						
Greensboro, N. C.		H			T				T
Wilmington, N. C.			R						
Sandusky, Ohio						H			
Erie, Pa.		T				H		R	R
Philadelphia, Pa.		H							H
Pittsburgh, Pa.								R	
Providence, R. I.		H							
Knoxville, Tenn.									H
Lynchburg, Va.		H							H
Richmond, Va.		H							H
Roanoke, Va.								R	
Huntington, W. Va.							E		
Parkersburg, W. Va.								H	
Schenectady, N. Y.				H	H				

H Highest for the date since records began.
T Tied highest for the date since records began.
R Highest for the month since records began.
E Equaled highest for the month since records began.

est in 60 years of record." Huntington, W. Va. reported "The 11-day period 18–28, of 80° F. or above was the longest April warm spell of record." Thus, it appears that the conditions which produced this warm spell must have been unusual, at least for this season of the year.

Numerous records were established or equaled during this period of high temperatures over the East, as may be observed from table 1. It should be understood that this is not a complete summary of records that were equaled or established at the Weather Bureau first order stations during this period, but rather that it is a partial list from available records.

5. PERIODS OF MAXIMUM TEMPERATURES

A survey of the daily maxima at many of the United States and Canadian weather offices distinctly indicated an eastward or southeastward progression in the occurrence of high temperatures during this period under study. Results of this investigation also suggested that the appearance of the thermal climax was in intervals of from 3 to 5 days. Generally, in the northern and central sectors of the East there appeared three such periods.

The initial area of maximum temperatures began on April 18 as a narrow band extending from New Orleans to Wichita, thence to Bismarck, International Falls, and into Canada (fig. 5). Considerable expansion of area occurred on the 19th and by the 20th it enveloped the Great Lakes region and extended to Tennessee. By April 21 the zone of maximum temperatures during the 5-day period had swung to the east coast except for a small area in the Southeast. In this position it produced one of the warmest, and in some regions the hottest, Easter Sunday of record. By the 22d the wave of warm

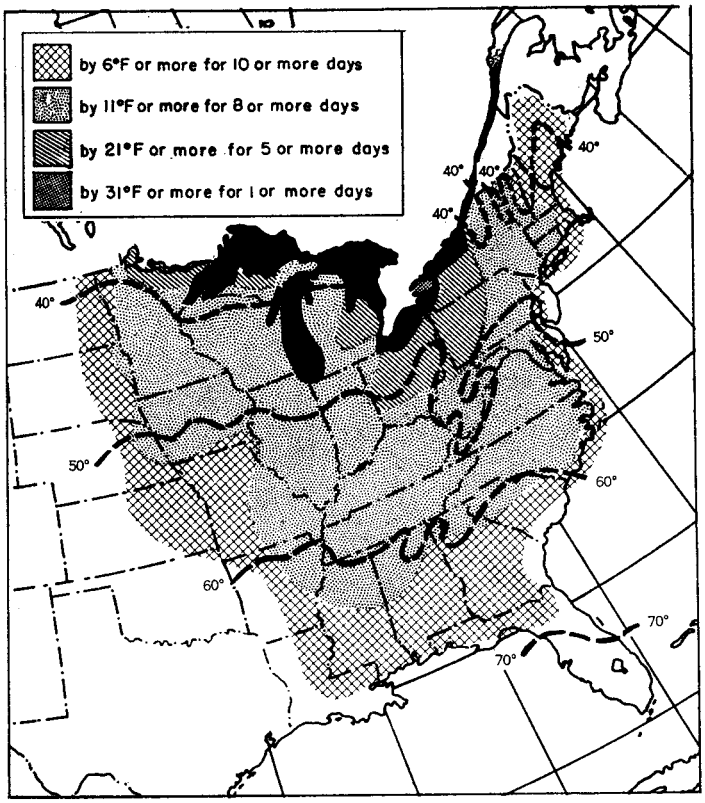


FIGURE 4.—The departure of the highest daily average temperature from the April monthly normal during the period April 18–30, 1957. Shading of different types has been used to distinguish different departure values (see legend on chart). Monthly mean isotherms for April are shown (dashed).

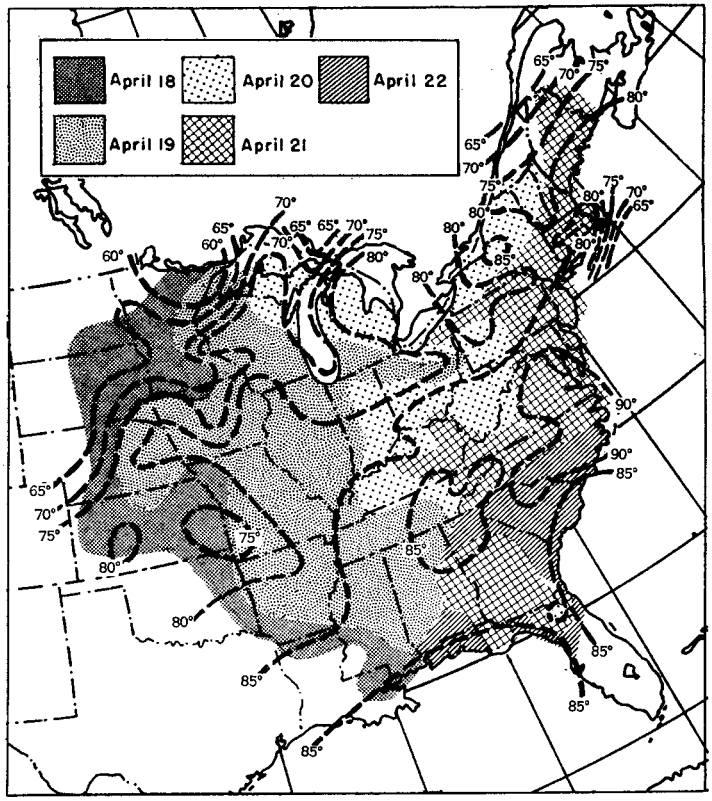


FIGURE 5.—Date of maximum temperature occurrence during period April 18–22, 1957. Shading of different types has been used to distinguish different dates (see legend on chart). Isotherms of maximum temperatures (dashed) during period April 18–22, 1957.

air had moved off the eastern seaboard except south of central Florida.

The second progression of high temperatures over the East reached its culmination prior to complete coverage of the eastern half of the Nation (fig. 6A). The initial impulse of high readings appeared on April 21 over the northern portion of the central and eastern Provinces of Canada and progressed south-southeastward until partial dissipation of the area of high temperatures appeared on the 24th; this region of high temperatures was practically eliminated from the chart on the 25th of April. Several possible reasons for this sudden cessation of the migration of these maximum temperatures are mentioned. It already has been stated that in the central portion of the East there was a prolonged period of high temperatures from the 18th to the 30th of April that set new records. Thus, it was difficult within this area to discern specific data for the appearance of a maximum, since readings frequently differed by only one or more degrees. Next, during the 23d and 24th considerable cloudiness prevailed over portions of Indiana, Ohio, New York, and Pennsylvania, with shower and thunderstorm activity during the afternoon hours. Finally, by midday of the 24th a "back-door" cold front had pushed southward over New England and eastern New York to bring cooling to that area.

The third invasion of high temperatures has been combined with the later stages of the second progression of high readings. Figure 6B contains the identical areas for the 24th and 25th as defined in figure 6A. These areas were repeated since temperature readings on these days were higher in the duplicated region than they were on the preceding or subsequent day. The areas of maximum temperatures in this final migration traversed the Nation in a more easterly direction and reached the coast on the 28th. Several new records were established during the latter period of this third migration of warm air.

Finally, it may be well to mention that the location of the 1000–700-mb. thickness warm tongue and the occurrence of maximum temperatures were prominently in close agreement on comparable dates. This area of daily highest temperature for a period was also in approximately similar agreement with the 1000–500-mb. thickness warm tongue and the 500-mb. constant pressure ridge line. However, the lower thickness chart indicated slightly closer agreement with the area of maximum temperatures. This is to be expected since the 1000–700-mb. thickness chart is a rather reasonable facsimile of the 850-mb.

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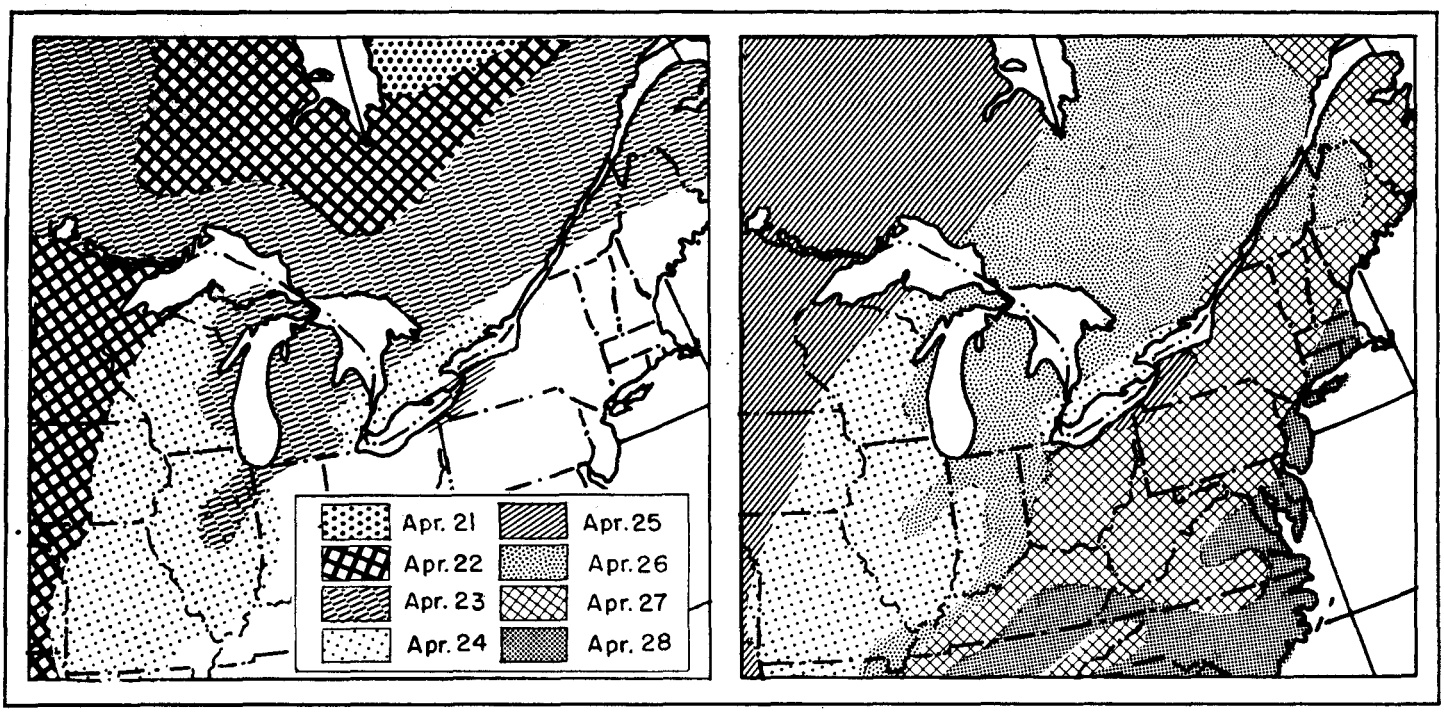

FIGURE 6.—(A) Date of maximum temperature occurrence during period April 21–25, 1957. (B) Date of maximum temperature occurrence during period April 24–28, 1957. Shading of different types has been used on these charts to distinugish different dates (see legend on chart).

temperature field, and this height normally is near the top of the afternoon dry adiabatic lapse rate in this area. Thus the use of thickness prognostic charts should aid considerably in locating the areas where temperatures will be the highest 24 to 48 hours hence.

6. FACTORS FAVORING HEAT WAVE

Some of the factors which occasioned this sudden and prolonged heat wave over the eastern States will be mentioned briefly in the following paragraphs.

Initially this change from subnormal to above normal temperatures over the eastern half of the country resulted from the readjustment in the planetary flow pattern over the Northern Hemisphere near the middle of April. This readjustment was attributed to the dissipation of one full-latitude trough over the Pacific Ocean as well as the development of a long-wave ridge over eastern Europe, thus producing subsequent displacements over the Northern Hemisphere of the long-wave troughs and ridges and their resultant locations over North America.

The mid-monthly adjustment in the planetary pattern over the Pacific produced a complete reversal in the position of the long-wave troughs and ridges over the United States. The long-wave trough above the eastern half of the country which had been productive of cold, wet weather during the first two weeks of April was almost instantaneously replaced by a long-wave ridge. (See Andrews [3] (fig. 1) for mean half-month 700-mb. charts for April.) For an illustration of the rapidity and magnitude of this pressure pattern adjustment note figure 1C where 500-mb. height and 1000–500-mb. thickness changes covering a 5-day period April 13–18 are presented. In the change charts immediately preceding or subsequent to this map the values were comparatively small.

The 5-day 500-mb. height change and the 1000–500-mb. thickness change for the period April 13–18 unmistakably defined this ridge as possessing warm characteristics. It will be noted that the thickness change comprised the greater portion of the 500-mb. height rise indicating that at sea level the pressure increase was only nominal. This fact may easily be observed by subtracting the 1000–500-mb. thickness values from the 500-mb. height values (fig. 1C) to obtain the 1000-mb. height change which may easily be converted into millibars. The resultant 1000-mb. chart would also show that the developing trough west of the ridge in this initial stage was associated principally with surface intensification.

Coincidental with these changes was the building of upstream and downstream blocks at both high and middle latitudes. Resultant intensification and sharpening of the amplitude in these troughs and ridges produced a more meridional flow over the Northern Hemisphere. One of the most pronounced areas of anticyclogenesis and blocking occurred over eastern Europe slightly prior to April 15. In this situation during one 24-hour period the 500-mb. height change chart indicated a rise of 1000 ft., and by April 21, the 500-mb. heights exceeded 1400

ft. above normal. The central positions of these anomalies migrated but slightly throughout the heat wave although the magnitude of the values decreased to near 700 ft. by the end of this study.

Because of blocking action and the development of strong meridional flow the large anticyclone over the eastern States remained practically stagnant for approximately 2 weeks, thus insuring persistence of the airmass over the area. Confirmation of this fact can be realized by reference to the cyclone and anticyclone tracks (Charts IX and X) or by observing figure 5B in Andrews' article [3]. These indicate that no cyclonic disturbance entered or developed in the eastern half of the Nation during this period.

Another feature that was compatible with this heat wave was the steady, prolonged, and relatively strong flow of tropical air northward. That this occurred at both surface and aloft is readily seen by reference to figure 2A–B. Thus, a source region of high temperatures and a means of transporting this warm air northward were available.

During this period of high temperatures the air over the greater portion of the East was relatively dry and precipitation was considerably below normal. This is not to say that some heavy rains did not occur locally, for they did, such as 1.24 inches in 20 minutes at Cincinnati, Ohio on the 22d. At Grand Rapids, Mich., heavy rain on April 24–25 flooded basements, streets, and viaducts. Rainfall for the last half of the month is shown in figure 4B and 4C of Andrews' article [3].

Thus, the following necessary ingredients for the development of a prolonged and pronounced heat wave were present: Stagnation of a large-amplitude anticyclone; height and thickness values considerably above normal at all levels; source region of tropical air and appropriate flow pattern for transportation of warm air over the region; little or no moisture in the upper air over the area, leaving the sky practically cloudless to allow maximum insolation; and finally, the lapse rate approaching the dry-adiabatic in the airmass to allow warming to a considerable depth.

7. EFFECTS OF HEAT WAVE

A few of the beneficial aspects as well as the detrimental effects that attended this hot period are mentioned. In many areas of the East the first half of the month was exceedingly wet and cold and so the change to a hot and comparatively precipitation-free regime was favorable to farming communities. It permitted drying and the working of the soil in preparation for spring planting. The sunshine aided materially in the rapid growth of many early crops. However, on the debit side there were areas in New England where a paucity of precipitation had existed for some time. Here, in conjunction with the lack of moisture, high temperatures, and at times strong to locally gale force winds, pastures and forests reached tinder dryness. Fires became numerous and forests were closed to the public. Massachusetts alone reported over 100 forest fires during the last half of the month. Many summer homes were destroyed by fire in New Hampshire, and thousands of acres of woodland were burned in the States of Massachusetts, Maine, New Hampshire, and Vermont.

ACKNOWLEDGMENTS

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REFERENCES

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2. U. S. Weather Bureau, *Weekly Weather and Crop Bulletin, National Summary*, vol. XLIV, No. 14, Apr. 8, 1957, and No. 15, Apr. 15, 1957, Chart A, p. 3.
3. J. F. Andrews, "The Weather and Circulation of April 1957—A Stormy Month Over the United States Characterized by Two Contrasting Temperature Regimes," *Monthly Weather Review*, vol. 85, No. 4, Apr. 1957, pp. 124–131.